Reg. No. : | | | | | | | | | | |

Question Paper Code: 32307

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

Second Semester

Electrical and Electronics Engineering

01UEE207- ELECTRIC CIRCUITS

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. A 230*V*, 100*W* lamp is connected to 200*V* supply. What will be the power dissipated by the lamp?
2. A fluorescent tube choke is connected across 230*V*, 50*Hz* AC supply. If the resistance and reactance of the choke are 100Ω, 1*H* respectively, determine the current through the choke.
3. A 12 *V* DC source has internal resistance of 1Ω. The maximum power that can be delivered by the source is _____.
4. What is the condition for maximum power transfer in DC and AC circuits?
5. Determine the resonance frequency of a RLC series circuit with R= 5Ω, L= 0.02H and C= 5μF.
6. Sketch the frequency response of a single tuned circuit.
7. Write the purpose of Laplace transformation in the circuit analysis.
8. Give the condition for Critical Damping of an RLC series circuit.
9. A star connected load has impedance of (6 + j8) Ω in each phase. Determine the line current when it is connected to 400 V, 3ϕ, 50 Hz supply.

10. In three phase power measurement using two wattmeter, what is the power factor if one wattmeter reads zero?

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Three resistors are in series and have a total constant voltage V_T. R_1 has a voltage of 20V, R_2 has a power of 25W and $R_3 = 2\Omega$. If the current through them is 5A, find V_T. (8)

(ii) Write the mesh current matrix equations for the network of figure 1 by inspection and solve for the mesh currents. (8)

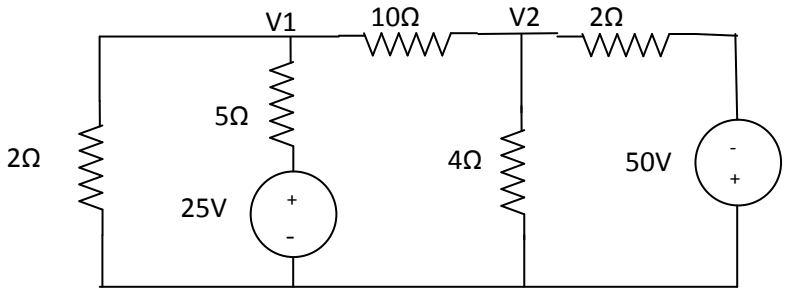
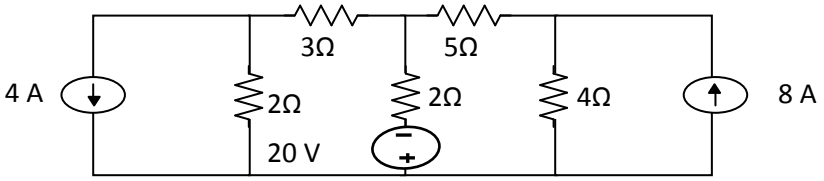


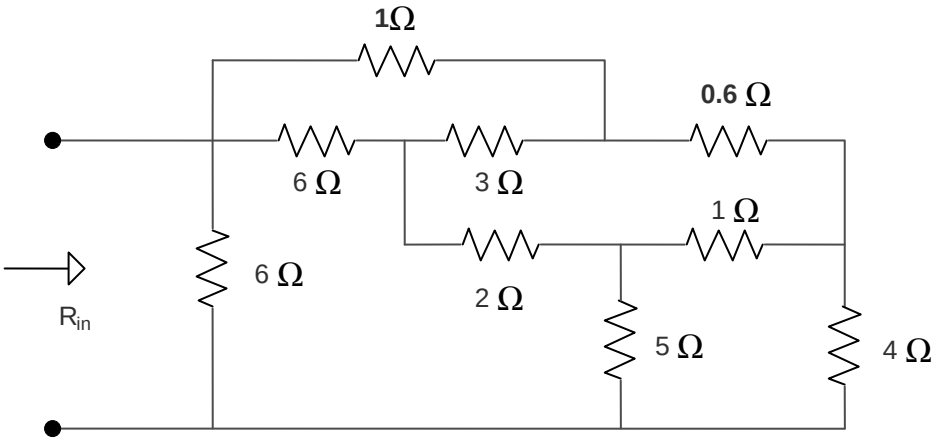
Figure 1

Or

(b) Using nodal analysis, calculate the current through the 5 Ω resistor in the circuit shown in figure 2. (16)



12. (a) Find R_{in} for the network shown in figure, by using Y - Δ and Δ - Y transformations. (16)



Or

(b) (i) Explain how three resistances connected in delta can be converted into equivalent star. Derive the relationship. (8)

(ii) An AC power source 100*V*, 50*Hz* has an internal impedance of 2 + j5 Ω. What will be the maximum power that can be delivered by this source to load? (8)

13. (a) A series RLC circuit consists of R = 16 Ω, L = 5 mH and C = 2 μF. Calculate the quality factor, bandwidth and half power frequencies. (16)

Or

(b) Two coils connected in series have an equivalent inductance of 0.8 H when connected in aiding and an equivalent inductance of 0.4 H when connected in opposing. Determine the mutual inductance. Calculate the self-inductance of the coils, by taking k = 0.55. (16)

14. (a) A RL series circuit is excited by a sinusoidal source e(t) = 10 sin 100t volts, by closing the switch at t = 0. Take R = 10 Ω and L = 0.1 H. Determine the current i(t) flowing through the RL circuit. (16)

Or

(b) A capacitor has an initial charge of Q_o. A resistor R is connected across the capacitor at t = 0, to discharge the charge. The power transient of the capacitor $p_c(t) = 800e^{-4000t}$ W. Find the value of R and Q_o. Take C = 10 μF. (16)

15. (a) A 415V, 50Hz, 3ϕ voltage is applied to three star connected identical impedances. Each impedance consists of a resistance of 15 Ω, a capacitance of 177 μF and an inductance of 0.1 H in series. Find (i) phase current (ii) line current (iii) power factor (iv) active power (v) reactive power and (vi) total VA. If the same impedance is connected in delta, find the line current and power consumed. (16)

Or

(b) Power is measured in a 3 phase, 400V (Line-Line) system by two wattmeters. If the readings are W_1 = 3500W and W_2 = 1500W, determine the line currents, power and power factor if reading of W_2 is obtained after reversing its potential coil. (16)